

# High-Level Accessibility Evaluation (WCAG 2.1)

Reaxys

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BTAA-Library Accessibility Alliance

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## TABLE OF CONTENTS

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<b>SUMMARY</b>	3
Top Findings	3
<b>ACCESSIBILITY FINDINGS</b>	4
1. Initial Interface	4
2. Structure Editor	5
3. Search Results	6
4. “Substances” Results	8
5. “Reactions” Results	9
6. “Documents” Results	10

## SUMMARY

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This report reflects the findings of a high-level assessment of Reaxys for its conformance with the W3C Web Content Accessibility Guidelines version 2.1 (WCAG 2.1).

This report shows that Reaxys does have some issues with WCAG 2.1 compliance, especially concerning screen reader support and ARIA implementation, as well as, minor concerns with color contrast that can be corrected by slightly tweaking colors. Although there were other issues uncovered that spread throughout the system, evaluation time limitations prevented full investigation into every issue returned in the analysis. Therefore, these are the most critical issues to focus on correcting to improve access for all potential users of the system.

### Top Findings

1. **Compatibility:** The most problematic issue with the current system is concerning the implementation of ARIA, a complex topic and important concern for screen reader support. For further information on best practices when it comes to ARIA implementation, please see the [WAI-ARIA Authoring Best Practices Guide from W3](#).
2. **Contrast:** Several color contrast issues were identified, particularly regarding small text and icons. Additionally, the analysis revealed several points of non-compliance with keyboard focus being conveyed using only color.
3. **Screen reader support:** While the screen reader does “work” there are several problems with implementation. e.g., the logical flow of information is broken, important information is not announced, elements are missing accessible text. Although this analysis was unable to perform an in-depth study of screen reader support, it is clear that the user experience for users that require the use of a screen reader is not equivalent and should be evaluated further.

## ACCESSIBILITY FINDINGS

This report was conducted against Reaxys and covers a selection of pages and features that were to be tested as a representative sample of the database's conformance to the WCAG 2.1 AA standards.

The resource was reviewed using a combination of manual and automatic review tools and assistive technologies, including the WAVE Accessibility Assessment tool, Axe Accessibility Assessment tool, WCAG Color Contrast Checker, and NVDA screen reader. All problems identified by automatic tools were double checked manually. This evaluation was performed using Firefox on Windows 10.

Below are the findings revealed during the accessibility evaluation of Reaxys.

### 1. Initial Interface

**Test Case:** Test initial interface/landing page to ensure menus, sub-menus, search box, images, icons, etc. are accessible.

The screenshot displays the Reaxys website interface. At the top, there is a navigation bar with links for 'Quick search', 'Query builder', 'Results', 'Retrosynthesis', and 'History'. On the right side of the navigation bar, there are buttons for 'Register >' and 'Sign in'. Below the navigation bar, the main heading reads 'Search substances, reactions and documents' with a sub-heading 'In Reaxys, PubChem, SignalPath and Commercial Substances'. A search box is present with the placeholder text 'Search Reaxys' and a 'Find >' button. Below the search box, there is a text input field containing 'Substance Properties, e.g. melting point of xylitol' and an 'AND' button. A 'Draw' button with a chemical structure icon is also visible. At the bottom of the page, there is a footer with the Elsevier logo, copyright information, and a 'Feedback' button. The footer also includes a 'Content Overview' section with statistics: '253M Substances', '59M Reactions', '97M Documents', '33M Patents', and '43M Bioactivities'. The footer also mentions 'RELI Group'.

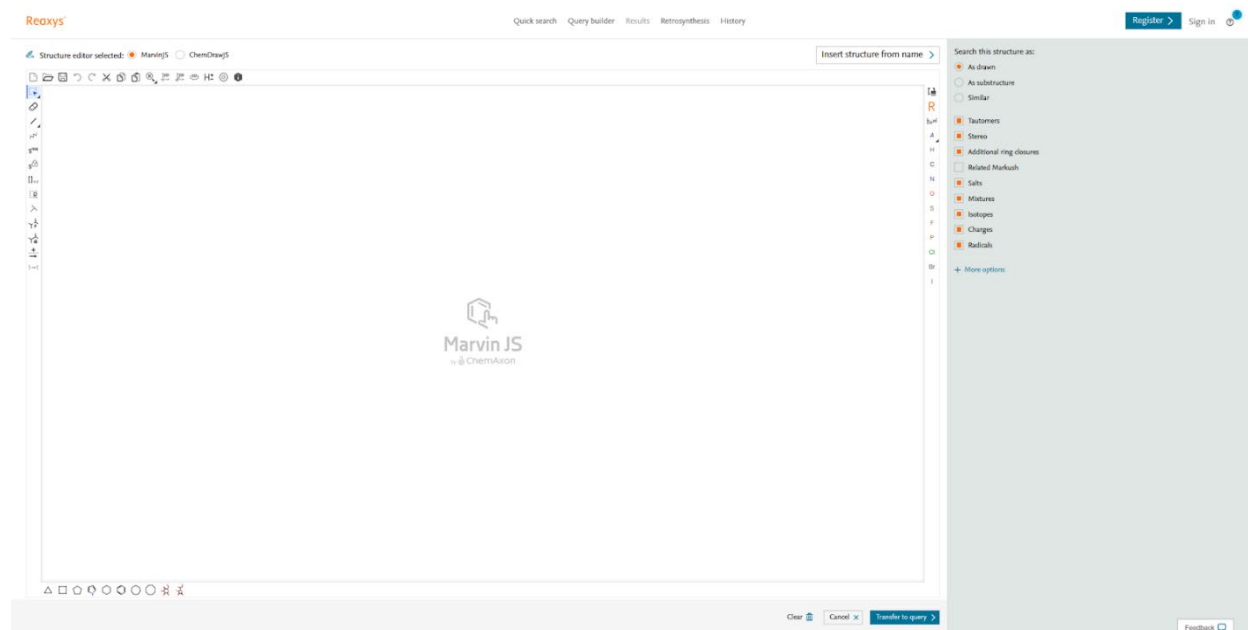
**SC 1.3.1:** All page content should be contained by landmarks.

**SC 1.4.1:** Color should not be the only thing used to convey keyboard focus. There should be a focus ring as well.

- SC 1.4.3:** Insufficient color contrast ratio of 2.84 in header navigation between text color #FF6C00 and background color #FFFFFF.
- SC 1.4.3:** Insufficient color contrast ratio of 2.96 in header navigation between disabled text color #969696 and background color #FFFFFF.
- SC 2.1.1:** Keyboard navigation breaks logical flow.
- SC 2.1.1:** The “import” feature cannot be accessed using the keyboard.
- SC 2.1.1:** Elements should not have a tabindex of greater than 0.
- SC 3.3.2:** Form field must not have multiple label elements. The search field has 2 labels associated with it.
- SC 2.4.9:** Links with the same accessible name must have a similar purpose. The “Reaxys” link in the header goes to a different page than the “Reaxys” link in the search area, but they both read the same. The links should have different accessible names if they serve a different purpose.
- SC 4.1.1:** The “id” attribute must be unique (29 issues returned, will need further investigation).
- SC 4.1.2:** Elements must only use allowed ARIA attributes. Concerning the “Help” link; the “aria-label” attribute is not well supported on an <a> with no valid role attribute.
- SC 4.1.2:** Aria attributes must conform to valid values. The ARIA attribute element ID does not exist on the page: aria-describedby=“new-input-validation-message.”

## 2. Structure Editor

**Test Case:** Using the “Draw” button to open the structure editor, test structure editor landing page to ensure menus, sub-menus, search box, images, icons, etc. are accessible.



- SC 1.3.1:** All page content should be contained by landmarks.
- SC 1.3.1:** Hidden elements must not be focusable or contain focusable elements. In relation to node “.struture-editor .mjs-obf-L”
- SC 1.4.1:** Color should not be the only thing used to convey keyboard focus. There should be a focus ring as well.
- SC 1.4.3:** Insufficient color contrast ratio of 4.24 between text color #007398 and background color #DFE6E4.
- SC 2.1.1:** Elements should not have a tabindex of greater than 0.
- SC 2.4.1:** Frames must have an accessible name. The structure editor frame needs to have an accessible name.
- SC 2.4.7:** Keyboard focus is very hard to see, specifically with the radio buttons and in the structure editor toggle buttons.
- SC 4.1.1:** The “id” attribute must be unique (31 issues returned, will need further investigation).
- SC 4.1.2:** Interactive controls must not be nested. The controls in the structure editor are nested.
- SC 4.1.2:** Elements must only use allowed ARIA attributes. For the radio button element, the ARIA attribute “aria-expanded=“false”” isn’t allowed.

### 3. Search Results

**Test Case:** Insert a benzene structure and use the “Transfer to query” button to add it to the search. Once back on the search screen use the “Find” button to run the search. Test the results page, including the “Preview Results” menu.

The screenshot displays the Reaxys search results interface. At the top, there are navigation tabs: "Quick search", "Query Builder", "Results", "Retrosynthesis", and "History". A "Register" button and a "Sign in" link are visible in the top right corner. The main content area shows "Results for" with a search icon and "New" and "Edit" options. The results are categorized into "Substances" (12,961), "Documents" (62,293), "Substances" (21,474,596), and "Reactions" (10,961). The "Substances" section is expanded, showing "Top 3 results":

Substance	Chemical Formula	Identification	Spectra	Preparations	Reactions	Documents
benzene	C <sub>6</sub> H <sub>6</sub>	78.1136 169212 71.43.2	856	4,363	44,334	49,313
benzene-d6	C <sub>6</sub> D <sub>6</sub> H <sub>6</sub>	84.066 330438 3376.43.3	385	43	1,649	1,752
phenyl radical	C <sub>6</sub> H <sub>5</sub>	77.1057 1848262 2384.41.2	45	122	264	1,317

Each result includes a chemical structure icon and a "Preview Results" button. The "Substances" section also includes a "View Results" button. The "Documents" section includes a "View Results" button. The "Substances" section includes a "View Results" button. The "Reactions" section includes a "View Results" button.

**SC 1.3.1:** All page content should be contained by landmarks.

**SC 1.3.1:** <li> elements must be contained in a <ul> or <ol>. The list items in the expanded “Preview Results” view are not contained within a <ul> or <ol> parent element without a role or a role=“list”.

**SC 1.4.1:** Color should not be the only thing used to convey keyboard focus. There should be a focus ring as well.

**SC 2.1.1:** Elements should not have a tabindex of greater than 0.

**SC 4.1.1:** The “id” attribute must be unique (29 issues returned, will need further investigation).

**SC 4.1.2:** Elements must only use allowed ARIA attributes. For the expanded “Preview Results” view, the ARIA attribute “aria-expanded=“true”” is not allowed.

**SC 4.1.2:** ARIA attributes must conform to valid values. In the expanded “Preview Results” view, the attribute value “aria-controls=“substances-1”” is invalid.

**SC 4.1.2:** Buttons must have discernable text. The buttons for the structure being searched do not have discernable text or an accessible name. Additionally, the buttons in the expanded “Preview Results” view should have an accessible name.

**SC 4.1.2:** ARIA role should be appropriate for the element. The list for the expanded “Preview Results” view has the ARIA role “search” which is not allowed for the given element.

**Screen reader:** Issues identified that are not compliant, e.g., lack of consistency in what is read, accessible names on buttons.

## 4. “Substances” Results

**Test Case:** From the results page, use the “View Results” button for “Substances” results and test the results page to ensure menus, sub-menus, pop-out filter menu, search box, images, links, etc. are accessible.

**SC 1.3.1:** All page content should be contained by landmarks.

**SC 1.3.1:** Contentinfo landmark should not be contained in another landmark.

**SC 1.3.1:** Form elements must have labels. In relation to elements “#rxSelectInput-new-database-switcher-select” and “#rxSelectInput-result-toolbar-sort-by”

**SC 1.3.1:** `<li>` elements must be contained in a `<ul>` or `<ol>`. The list items in the search results view are not contained within a `<ul>` or `<ol>` parent element without a role or a role=”list”.

**SC 1.4.3:** Insufficient color contrast ratio of 1.52 between text color #B3B3B3 and background color #DCDCDC.

**SC 1.4.3:** Insufficient color contrast ratio of 1.8 between text color #B9B9B9 and background color #F5F5F5.

**SC 2.1.1:** Elements should not have a tabindex of greater than 0.

**SC 2.4.6:** Page should contain an h1

**SC 4.1.1:** The “id” attribute must be unique (29 issues returned, will need further investigation).

**SC 4.1.2:** Elements must only use allowed ARIA attributes. For node “.substances”, the ARIA attribute “aria-level=”1”” is not allowed. For element “.e2e-breadcrumb-preview” the attribute “aria-level=”0”” is not allowed.



**SC 4.1.2:** ARIA attributes must conform to valid values (16 issues reported, further investigation needed).

**SC 4.1.2:** ARIA commands must have an accessible name. In relation to element “.results-filters-collapse-widget”.

**Screen reader:** Issues identified that are not compliant, e.g., lack of consistency in what is read, accessible names on buttons.

## 5. “Reactions” Results

**Test Case:** From the results page, use the “View Results” button for “Reactions” results and test the results page to ensure menus, sub-menus, pop-out filter menu, search box, images, links, etc. are accessible.

The screenshot displays the Reaxys 'Reactions' results page. The top navigation bar includes 'Quick search', 'Query builder', 'Results', 'Retrosynthesis', and 'History'. The sidebar on the left contains various filters such as 'By Structure', 'Yield', 'Reagent/Catalyst', 'Solvent', 'Catalyst Classes', 'Solvent Classes', 'Product Availability', 'Reaction Availability', 'Reaction Classes', 'Document Type', and 'Publication Year'. The main content area shows a list of reactions, each with a chemical structure, reaction ID, conditions, and a table of references. The table columns are 'Yield' and 'Reference'. The references include patent information and journal articles.

**SC 1.3.1:** All page content should be contained by landmarks.

**SC 1.3.1:** Contentinfo landmark should not be contained in another landmark.

**SC 1.3.1:** Form elements must have labels. In relation to element “#rxSelectInput-result-toolbar-sort-by”

**SC 1.3.1:** <li> elements must be contained in a <ul> or <ol>. The list items in the search results view are not contained within a <ul> or <ol> parent element without a role or a a role=“list”.

**SC 1.4.3:** Insufficient color contrast ratio of 1.96 between text color #B9B9B9 and background color #FFFFFF.

**SC 1.4.3:** Insufficient color contrast ratio of 3.52 between text color #86888B and background color #FFFFFF.

**SC 2.1.1:** Elements should not have a tabindex of greater than 0.

**SC 2.4.6:** Page should contain an h1

**SC 3.3.2:** Form field must not have multiple label elements. In relation to element “#goToPageId”.

**SC 4.1.1:** The “id” attribute must be unique (29 issues returned, will need further investigation).

**SC 4.1.1:** IDs used in ARIA and labels must be unique (10 issues returned, further investigation needed).

**SC 4.1.2:** Elements must only use allowed ARIA attributes (42 issues returned, further investigation needed).

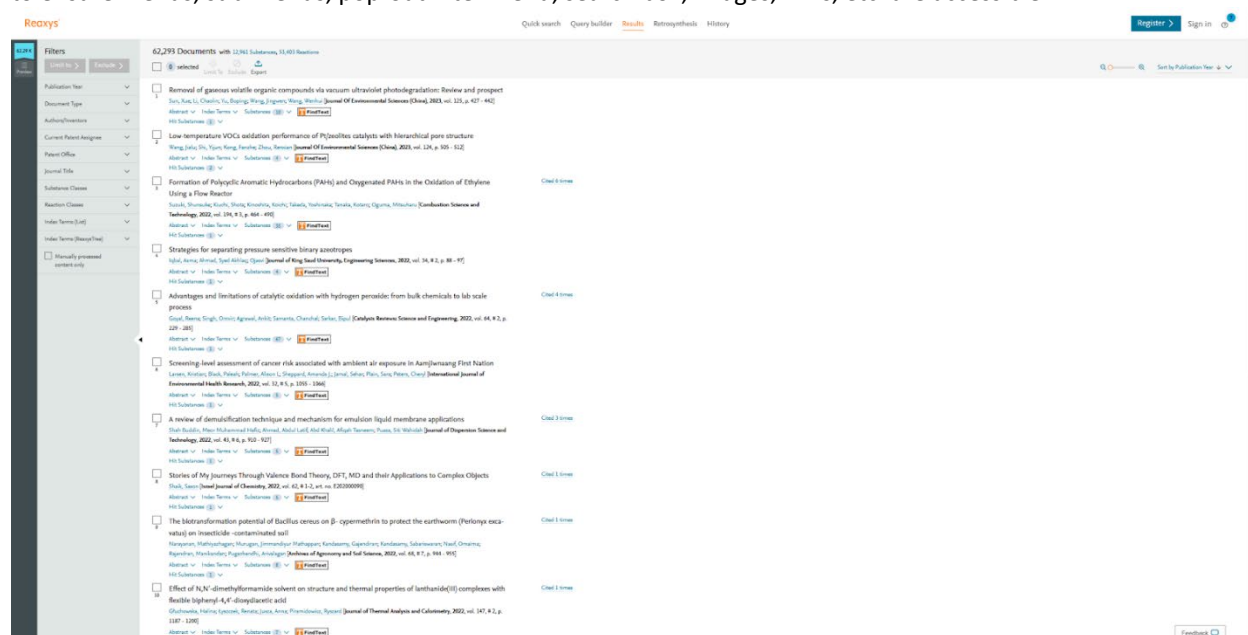
**SC 4.1.2:** ARIA attributes must conform to valid values.

**SC 4.1.2:** ARIA commands must have an accessible name. In relation to element “.results-filters-collapse-widget.”

**SC 4.1.2:** Buttons must have discernable text (11 issues returned, further investigation needed).

## 6. “Documents” Results

**Test Case:** From the results page, use the “View Results” button for “Documents” results and test the results page to ensure menus, sub-menus, pop-out filter menu, search box, images, links, etc. are accessible.



**SC 1.3.1:** All page content should be contained by landmarks.

**SC 1.3.1:** Contentinfo landmark should not be contained in another landmark.

**SC 1.3.1:** Form elements must have labels. In relation to element “#rxSelectInput-result-toolbar-sort-by”

**SC 1.4.3:** Insufficient color contrast ratio of 3.97 between text color #007398 and background color #D3DFEB.

**SC 2.1.1:** Elements should not have a tabindex of greater than 0.

**SC 2.4.6:** Page should contain an h1

**SC 4.1.1:** The “id” attribute must be unique (29 issues returned, will need further investigation).

**SC 4.1.2:** Elements must only use allowed ARIA attributes.

**SC 4.1.2:** ARIA attributes must conform to valid values.

**SC 4.1.2:** ARIA commands must have an accessible name. In relation to element “.results-filters-collapse-widget.”

**SC 4.1.2:** ARIA role should be appropriate for the element. In relation to element “.rx-list-citations”.

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